The Limnological Institute

A conservation organization providing research and solutions for the preservation of our inland waters.

2005 Dutch Hollow Lake Aquatic Plant Management Plan

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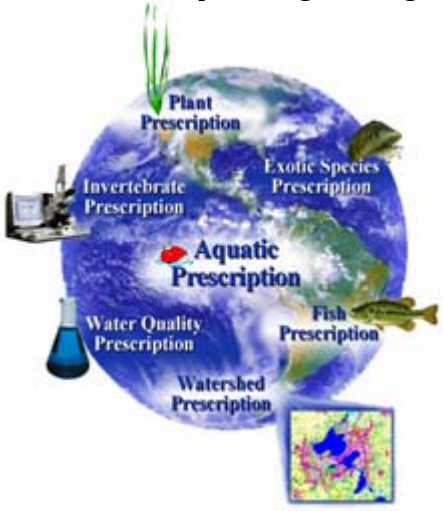

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In cooperation with the Wisconsin Department of Natural Resources

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Acknowledgements

The 2005 Dutch Hollow Lake Aquatic Plant Management Plan was completed based largely on information gathered through two Department of Natural Resource (WDNR)-administered Lake Planning Grants (# LPL-1032-05 and LPL-1029-05), which provided funding for 75% of the plant and water quality monitoring costs. A special thanks to the following individuals for their help throughout the project:

Dutch Hollow Lake Property Owners Association, Inc.

Dale Nelson	President
James Ryan	Vice President
Linda Reeder	Treasurer
Mary Peterson	Board Member
Tom Schneider	Board Member
Tom Miller	Board Member
Bette Simono	Board Member
Judy Skrabel	Board Member
Joan Whitehurst	General Manager

Wisconsin Department of Natural Resources

Susan Graham	Lake Coordinator
Pat Sheehan	Environmental Grants Specialist

Executive Summary

Dutch Hollow Lake is a 210-acre lake in the townships of LaValle and Woodland (WBIC 1286500; T13N R2-3E S13,14 and 18,19) in Sauk County, WI. Dutch Hollow is a drainage lake which was constructed by impounding Dutch Hollow Creek and several intermittent streams. The lake has an average depth of approximately 18 feet and a maximum depth of 40 feet.

The lake contains two non-native plant species, Eurasian water-milfoil (EWM) and curly-leaf pondweed (CLP) and is a mesotrophic body of water. The Dutch Hollow Lake Property Owners Association, Inc. has not performed official aquatic plant or water quality monitoring since the inception of the Association.

Several lake residents have been contracting private herbicide application firms to help manage nuisance aquatic vegetation from around their high-use recreational areas (e.g., docks, piers, navigational channels). The plant management efforts have not been coordinated and are not completed as part of a larger plan. The Association is being proactive, recognizing the future need for plant management activities, and has asked The Limnological Institute to help create and implement a WDNR-approved plan.

The Limnological Institute applied for aquatic plant and water quality grant funding through the WDNR-administered Lake Planning Grant program in 2005 and received funding for monitoring activities, which were performed in 2005. The Association will receive a Water Quality Monitoring Technical Report and an Aquatic Plant Monitoring Technical Report, which will summarize the monitoring activities. These reports will be instrumental in establishing baseline inventory data, which will be used to form the Aquatic Plant Management (APM) Plan.

This report gathers all past management data, including the 2005 monitoring reports, and outlines an APM plan, which will help the association maximize their resources and

organize for a unified plant management effort backed by public support, Sauk County, and the WDNR. The key elements of the APM Plan are:

- Annual EWM herbicide applications (Figure 3, page 33)
- AIS prevention program – participation in Clean Boats, Clean Waters program
- High recreational use area management
- Water quality monitoring – participation in self-help Secchi monitoring and collecting temperature, TP, Chl a, and dissolved oxygen five time per year from May to October.
- Qualitative aquatic plant monitoring every year
- Professional quantitative aquatic plant monitoring every 3 to 5 years
- Public outreach – public meetings, "The Dutchman" publication, and Website

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1.0 Introduction

In the summer of 2005, Aquatic Engineering, Inc. (AEI) performed water quality and aquatic plant monitoring activities on Dutch Hollow Lake (Sauk County, WI). Analyses included in the water quality report included baseline water chemistry, Secchi depths, chlorophyll *a*, and trophic status index (TSI) calculations. The monitoring activities were partially funded through the Lake Planning Grant program administered by the WDNR (grant # LPL-1029-05).

The results of the water quality monitoring and analysis show that Dutch Hollow Lake is a mesotrophic lake that experiences moderate macrophyte growth and algal blooms. The composite TSI value in 2005 was 45.7, which indicates Dutch Hollow Lake was mesotrophic. The results of water quality monitoring show that the quality (clarity and nutrient levels) is excellent and has remained relatively unchanged since 1988. A complete summary of the water quality monitoring activities can be found in the "2005 Dutch Hollow Lake Water Quality Monitoring Technical Report".

Aquatic plant monitoring activities in 2005 included whole lake qualitative and quantitative surveys. In addition to sampling the plant community, the surveys also included analyses of sediment type and riparian land use. The plant monitoring activities were also partially funded through the Lake Planning Grant program (grant # LPL-1032-05).

The results of the plant surveys show that Dutch Hollow Lake has a diverse plant community. Two of the plant species are non-native species, Eurasian water-milfoil (EWM) and curly-leaf pondweed (CLP). Though they are found at low densities throughout the lake, they can cause nuisance conditions in localized areas. Diversity indices show that the plant community within Dutch Hollow Lake is in the upper quartile (i.e., at least 75% of lakes in the region have less diversity in their plant community).

This document compiles information regarding the Dutch Hollow Lake ecosystem and outlines an Aquatic Plant Management (APM) Plan. The plan considers objective information regarding inventory data, public input, historical conditions, and current plant and water quality conditions. The plan reviews management options and follows WDNR recommendations for managing aquatic plants within Wisconsin. The APM Plan can be used to create a Lake Management Plan (LMP).

The major components of the plan are EMW management through herbicide applications, water quality protection through BMP and public education measures, and native plant protection through education and planning. Plant surveys and water quality monitoring have been occurring since the late 1980's and will continue to occur under the direction of this plan.

Purpose Statement

The mission of the Dutch Hollow Lake Property Owners' Association is to promote the health, safety, and welfare of members, their families, guests, employees, and the general public, and to be wise stewards of our natural resources of land and water for present and future generations.

2.0 Description of Problems

Water Quality

The findings of the 2005 water quality monitoring show that Dutch Hollow Lake is a mesotrophic system that does not experience nuisance algal blooms, plant growth, or elevated nutrient levels. Results of the public use survey show a majority opinion that water clarity has not changed over time; this was supported by reviewing existing data. The public also believes that water quality is an important aspect of the ecosystem and needs to be managed.

The exact source of nutrients have not yet been identified, but it is likely that surface runoff plays the largest role. Internal loading and septic leachate (both non-point sources) may also be contributing nutrients, but the amount of contribution is unknown. A complete hydrologic budget and internal loading study, which are currently not available, are required to create a detailed nutrient budget and would shed light on the amount of phosphorus originating from runoff and internal loading.

Aquatic Vegetation

The findings of the 2005 aquatic plant monitoring show that Dutch Hollow Lake has a healthy macrophyte community that is not dominated by any one species but rather contains a mix of native species in addition to two non-native species. Most of the lake shoreline has steep contours, and the littoral zone is located near shore only (Figure 1). In some areas of the lake, EWM does become a nuisance. The popular public opinion is that excessive weed growth inhibits enjoyment of the lake, is worse in some areas than others, and is not being managed effectively. The survey also confirms that the public believes nuisance plants and algal blooms have worsened over time.

The current body of knowledge regarding the aquatic plant community in Dutch Hollow is not extensive enough to determine what long-term trends are. The data do indicate the community is healthy and well established for a relatively young body of water. Public education should focus on discussing the importance of aquatic vegetation and what

problems are worth managing and what impacts management would have on other aspects of the lake ecosystem.

Public Perception

The public survey revealed that most people believe fluctuating water levels, fertilizer and pesticide use, and motorboat traffic are causing the undesirable plant, algae, and water clarity conditions within the lake. Regardless of the perceived causes, the majority of respondents (66%) feel they have a voice in making decisions regarding lake management activities.

It is clear that in order for their management plan to be successful, the Dutch Hollow Lake Property Owners Association, Inc. will need to solicit public opinions and gain public support for their APM Plan. However, the water clarity, plant community, and algae growth should not be considered undesirable. Water clarity is average for the state but excellent for the ecoregion. Plant and algae growth is limited to the perimeter of the lake due to steep contours. Plant growth can become problematic in certain regions of the lake but can also be controlled easily. Algae growth is controllable through plant and nutrient management and through managing the small watershed.

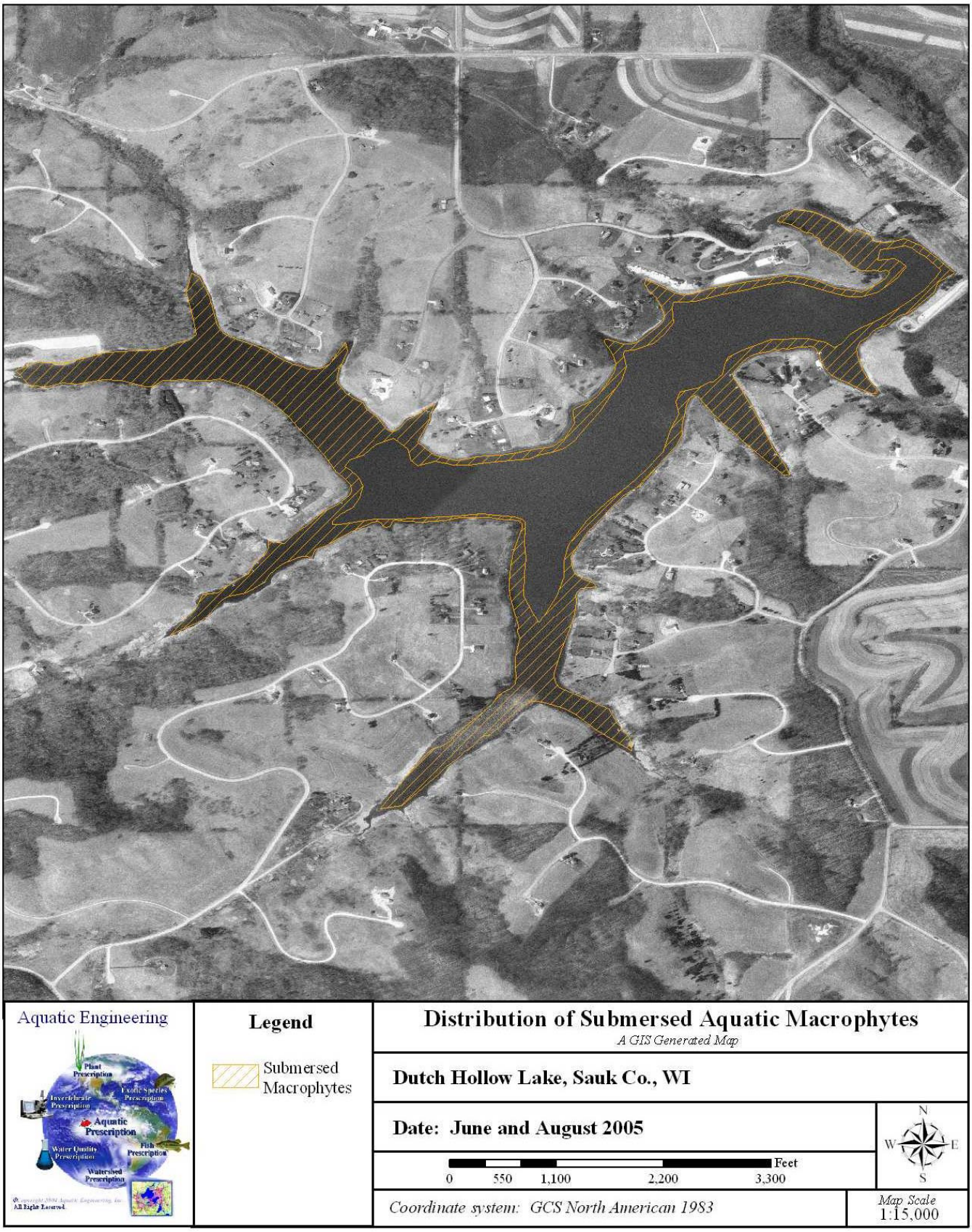

Figure 1. Distribution of submersed macrophytes in Dutch Hollow Lake (Sauk County, WI).

3.0 Review of Management Options

3.1 Options for Managing Aquatic Macrophytes

The following subsections provide an overview of management strategies that are commonly used to manage eutrophic effects on lakes. The purpose of this section is to provide a general introduction to popular management strategies for future reference and consideration. Methods described are derived from the Managing Lakes and Reservoirs manual prepared by the North American Lake Management Society. Practices that are relevant to Dutch Hollow Lake are described in more detail in the following sections.

Mechanical weed harvesting can be used to remove the upper portion of rooted vegetation. Weed harvesters are low-draft barges that cut and remove vegetation growing at or near the water surface. A harvester can generally operate at a rate of approximately 0.2 to 0.6 acres per hour, depending on equipment. Once cut, the plants are moved via conveyer to a holding area on a barge until the cut plants can be unloaded, via a second conveyer, at the shore. Plants are usually transported away from the lake to a compost site or a landfill. The physical removal of plant material means that the nutrients trapped in the plants are also removed from the lake ecosystem.

Harvesting is most effective to remove plants in three to six feet of water growing in dense beds. Harvesting can be used to open navigational channels, remove weedy obstructions from highly used recreational areas, or to produce relief for fish in weed-choked areas of a lake. Harvesting is non-specific and will remove all plants within the harvested area. Sometimes fish become trapped in harvested plants and end up being removed from the lake as well. Harvesting equipment is usually expensive, and operational costs vary depending on the harvesting effort required. Effects of harvesting are immediate, and there is no use restriction during operations. Wisconsin Department of Natural Resources permits are required for mechanical harvesting. Contact the local APM coordinator for more information regarding permitting requirements.

Manual weed harvesting is a scaled-down method of mechanical harvesting. In manual weed harvesting, weeds can be uprooted completely or simply cut close to the sediment using a variety of equipment from drag lines and garden rakes to specially designed weed cutters. This method is the most species-specific mechanical method of plant removal since an individual can physically see which plants are going to be removed and which will be missed. This method, however, is also the most labor-intensive means of controlling plants, and its feasibility is directly affected by the available labor force. This method is most applicable to individual property owners who wish to maintain clear areas for swimming, fishing, and for boat access to their dock. Since many times plants are not removed from the root, repeated efforts are needed to maintain the benefits. Wisconsin Department of Natural Resources permits may be required for manual harvesting. Contact the local APM coordinator for more information regarding permitting requirements.

Sediment screens range from fiberglass or plastic mesh screens to simply sand or gravel, and are placed on the existing sediment and plants to block light and suppress growth. While the synthetic barriers make better screens, they are the most difficult to install and maintain. The screens must be installed early in the year and securely anchored to the sediment to prevent them from being disturbed. The screens must be removed and cleaned periodically to prevent sediment from building up on top of them.

Sand and gravel are more natural means of suppressing aquatic vegetation and are less expensive, but they also require maintenance on an annual basis and are less effective. Wisconsin Department of Natural Resources permits are required for sediment screening. Contact the local APM coordinator for more information regarding permitting requirements.

Water level manipulation, commonly referred to as “draw-down”, is a useful way to control nuisance vegetation that occurs in the shallow regions of a lake. This method is typically applied in the fall and over winter. Cold, dry conditions are best for a draw-down event, because frozen sediments will kill most of the seed bank and compress soft

sediments. Both of these conditions prevent plant growth in the following spring when the water level is brought back up to normal conditions. This method severely impacts recreational uses while the water level is lowered and has the potential to trap fish and other wildlife in shallow areas that may not become completely dry but do freeze from top to bottom over the winter.

Drawing the water level down in the summer has the opposite effect on plant growth. Lowering the water level generally increases the wetland area, and the littoral zone of a lake becomes larger. This provides more habitat for plants to become established. This is a low-labor option but can become expensive if power is generated at a dam. The power company may be entitled to compensation for loss of power generated during the draw-down.

Raising the water level in the summer can also suppress aquatic vegetation by limiting the amount of light penetrating to the bottom thereby making the littoral zone smaller.

Wisconsin Department of Natural Resources permits are required for water-level manipulations. Contact the local APM coordinator for more information regarding permitting requirements.

Dredging sediments and plants is usually only performed when an increase in depth is a required part of the management outcome. If the depth is increased sufficiently, light penetration is limited in the dredged area and plant growth is suppressed. Dredging an entire lake bed is very rarely performed. Dredging small areas for boat access and other recreational uses is a cheaper and more applicable compromise. Wisconsin Department of Natural Resources permits are required for dredging. Contact the local APM coordinator for more information regarding permitting requirements.

Chemical control of aquatic plants and algae is often used in areas where vegetation has created nuisance conditions. Herbicides and algaecides are used to control a wide variety of plant and algae species. Some herbicides and application methods are very specific for

which plants they will control. Others control a wide variety of vegetation. In some cases, the precision and concentration of herbicide applied will also determine which species are controlled.

Chemical applications are designed to control vegetation which is already present and rarely address the underlying nutrient problem associated with nuisance plants and algae. They are sometimes the only economically feasible method for creating recreational relief. Recent advances in technologies have made chemical control a more favorable tool for managing exotic species selectively while restoring native habitats. Wisconsin Department of Natural Resources permits are required for aquatic herbicide applications. Contact the local APM coordinator for more information regarding permitting requirements.

Biomanipulation refers to altering a food web in order to obtain a desired end result. In the case of controlling algae, a "top-down" approach is taken. Promoting top-level predator fish like muskellunge, walleye, largemouth bass, and northern pike naturally reduces the panfish population. Panfish typically graze on zooplankton (algae eaters) and when zooplankton reach high numbers, more algae is consumed and the water clarity is increased. This method is generally used only to improve water clarity, however improved water clarity has a significant impact on plant distribution within the lake. Wisconsin Department of Natural Resources permits are required for biomanipulation. Contact the local APM coordinator for more information regarding permitting requirements.

Biological Control Agents is a term used to describe organisms capable of controlling other organisms within their ecosystem by various methods. For example, loosestrife weevils have been used to control the exotic plant purple loosestrife. The weevils are tiny insects that use the plants for food, shelter and to reproduce. The weevil larvae consume plant material and make growth and reproduction difficult, if not impossible, for the plant. A similar situation is suggested to occur for the aquatic exotic plant EWM.

There are no known biological control agents that would improve conditions within Dutch Hollow Lake with respect to CLP and nuisance natives.

No management means that the lake resources are not actively managed but are monitored on a regular basis. Monitoring results are tracked and compared from year to year. When conditions that warrant management are discovered, a management tool is selected. In some cases, the plant community will face a natural obstruction and balance is regained naturally.

3.2 Discussion of Management Options

Of the listed management options, mechanical weed harvesting, water level manipulations, and dredging are methods that entail a level of management not warranted by the conditions of Dutch Hollow Lake's plant community (i.e., they are levels of control that would be "overkill" given the extent of the problem on Dutch Hollow Lake). Biological control agents and biomanipulation would also not be practical. Biological control agents require larger stands of EWM to be effective and biomanipulation would mean permanently altering the fish community.

The four most applicable management options for the issues facing Dutch Hollow Lake are (1) manual weed harvesting; (2) chemical control; (3) sediment screens; and (4) no management. Of the four listed options, sediment screens are the most disruptive and leave the largest chance of spreading invasive plants in the long run, are difficult to get WDNR approval for, and are not a practical solution. Monitoring, manual harvesting, and chemical applications are the most practical immediate management practices and can be achieved on an individual basis by property owners.

Herbicide applications can provide relief for several weeks up to a full season or longer. Typical applications are designed to provide relief approximately one week post-application and last approximately one month. Currently, individual property owners contract professional management firms to treat the nuisance plants near their high-use recreational areas such as piers, boat lifts, and swimming areas. The Association should

organize property owners interested in this type of management and facilitate an organized treatment plan to meet short-term goals of the management plan.

Some property owners may also exercise their right to manually remove plants provided under state statutes NR 107 and NR 109. This method is not specific to the plant causing nuisance conditions and is therefore not an ideal method for the long term management of the plant community. Residents should contact the regional APM coordinator before performing any plant management activities.

In most cases, integrated approaches produce the best results. Regardless of the selected management activities, the goal of the plan should be to enhance the native plant community and protect valuable habitat while limiting growth and distribution of non-native plants. Aggressive herbicide treatments will need to occur for several years before less aggressive maintenance treatments will be effective.

4.0 Aquatic Plant Management Overview

A complete aquatic macrophyte management plan follows a series of steps. A plan organizes labor and resources for a clearly defined mission and outlines a way to measure success. The WDNR has created a set of guidelines for aquatic plant management in Wisconsin. The guidelines outline a seven-step process for managing aquatic plants. The steps to completing a plant management plan are:

- Setting Goals. . .Why are We Doing This?
- Inventory. . .Gather Information
- Analysis. . .Synthesis of the Information
- Alternatives. . .Providing Choices
- Recommendations. . .Completing the Plan for a Formal Decision
- Implementation. . .Taking Action
- Monitor and Modify. . .So How are We Doing?

The following sub-sections describe what measures the Dutch Hollow Lake Property Owners Association, Inc. has taken to complete each step.

4.1 Setting Goals

The Association has identified problems facing lake users and what endpoint is desired through management efforts. The Association has created a goal statement which provides direction for the duration of this plan.

Goal Statement

The goal of the Dutch Hollow Lake APM Plan is to organize Association resources, inform members and the public of current aquatic plant issues, and take action to manage the aquatic plant community within Dutch Hollow Lake.

4.2 Inventory

Historical Data

TLI has collected and organized historical data regarding the aquatic plant community, fishery and wildlife, and water quality of Dutch Hollow Lake. Water quality data show that the lake is mesotrophic and has remained essentially unchanged since the lake was created. Historic plant inventory data show that the plant community has also not changed much since 1988. The plant community is diverse and contains at least one species indicative of low disturbance conditions.

Current Inventory Data

Current plant community inventory, water quality data, and public opinion were collected as part of planning. The new data has helped improve the baseline inventory data available for Dutch Hollow Lake. Future data will be compared to baseline data and may indicate long term trends in water quality and the aquatic plant community.

Organizing Data

All lake management plan documents, procedures, committee reports, surveys, contracts related to water quality, lake monitoring data, and all other items pertinent to the lake plan development, approval, implementation, and monitoring will be maintained at the DHLPOA clubhouse. These documents will be stored in the clubhouse office and will be available to all DHL property owners, and all other interested individuals upon request.

4.3 Analysis Report

Water Quality

The current water quality conditions are favorable for recreation and meet the needs of Association members. Public opinion supports this assessment. The Association will focus on water quality monitoring and protection for the time being. Preventative actions are required to avert worsening conditions. It is more difficult to manipulate water quality once eutrophic conditions are established so a primary objective is to prevent such conditions from establishing.

Aquatic Plants

Plant inventory data suggests EWM is not as widespread as previously thought (Figure 2). Plants that cause nuisance conditions in the summer generally occur at the back of shallow bays and only affect a few residents. Large areas of EWM exist along some shorelines and should be monitored annually to determine if density or distribution increase. If management actions should be needed to meet the Association's goals, they will likely include early summer EWM treatments and nuisance mid-summer native treatments. The goal will be to maintain recreational use while promoting native plants and minimizing impacts on water quality.

The Association also recognizes the importance of a diverse native plant community. Floating leaf and emergent plants are vital to the health of the ecosystem and since they are generally less abundant than submersed plants, there will be an increased emphasis on protecting them when planning management activities. The Association will also promote establishment and maintenance of vegetated buffer strips along the lake shoreline. Buffer strips will help protect water quality and will provide habitat for wildlife. The Association has promoted greenway zones throughout the watershed to improve and protect wildlife habitat. The shorelines of the greenway zones will be maintained as natural shorelines with natural vegetation.

Public Use

The nature of people's concerns is genuine and in the best interest of the lake resource. The Association is unified in its efforts, but some use conflicts are apparent. One use conflict is that most residents feel motorboat and personal watercraft traffic has increased over the last several years and that the increased traffic and the noise that comes with it negatively impacts their use and enjoyment of the lake. Most respondents would be in favor of expanding no-wake zones and times. Since many people believe peace and tranquility significantly contribute to their enjoyment of the lake and that motor boat traffic has increased over the year, the Association will pursue expanding limitations as part of the immediate or short-term implementation actions. The conflict will be in getting motorboat and personal watercraft users to agree to the expanded zones and times.

Management Level

Based on the analysis of the inventory data and public feedback, Level II management is the necessary level to manage the plant community within Dutch Hollow Lake. For the situation on Dutch Hollow, Level I management would suffice in the absence of exotic species. However, the WDNR recommends elevating to Level II management whenever exotic species are present. The elements of this plan are that of a Level III management plan. The reason for this is because a Level III management plan gives the Association information than a Level II management and leaves options open if Level III management is deemed necessary in the future.

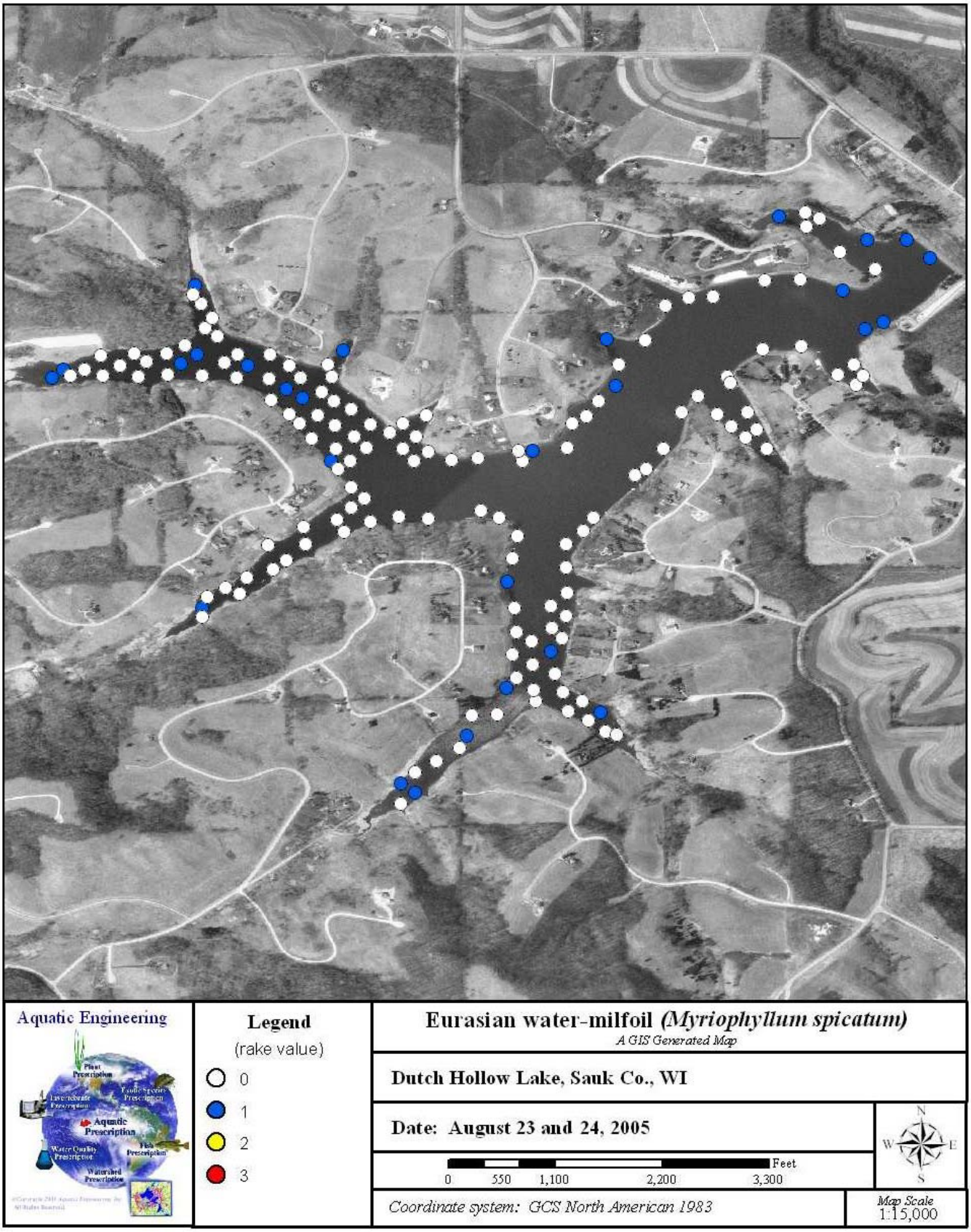

Figure 2. Distribution of EWM in Dutch Hollow Lake (Sauk County, WI) summer 2005.

4.4 Alternatives

It was difficult to conduct an analysis without simultaneously considering alternative management techniques. However, the need for and level of control was established independent of choosing the control method. The amount of discussion on alternatives corresponds with the level of control proposed (level II).

The Association was presented with alternatives suitable for Dutch Hollow Lake and is aware of the costs and benefits associated with each. Association members have reviewed the table on the following page.

The Association looked more specifically at managing EWM through herbicide applications of 2,4-D. This chemical is specifically designed to control dicotyledonous plants (like EWM) and not harm monocots (like pondweeds). Water stargrass, bladderworts, white and yellow water lilies, spatterdock, water shield, water chestnut, and coontail are all native plats that are also susceptible to 2,4-D. To prevent damage to these plants, dosages should remain high enough to control EWM but lower than the dosage needed to control natives. Timing can also be used to prevent damage to native plants. Recent studies have shown that EWM can be controlled with 2,4-D when water temperatures are between 55 and 60 degrees Fahrenheit. At these temperatures, some native plants have not begun to germinate. By treating EWM early in the season, damage to native plants can be minimized.

Irrigation restrictions will be in place until October 31 or until an approved bioassay shows the concentration of 2,4-D is below 70 ppb. Drinking water restrictions should not affect lake users as the lake is not a source of drinking water for surrounding residences.

	Benefits	Drawbacks	Applicable	Recommended	Costs[1]	Longevity
Mechanical Harvesting	Removes plants and nutrients	Small areas controlled	No	No	$200,000 equipment and $200-600 per acre	1-3 Weeks
	Immediate relief	Can not reach shallow areas				
	No use restrictions	Not species selective				
	No potentially harmful chemicals	Promotes growth of opportunistic plants				
Manual Harvesting	Species specific	Labor intensive	Yes	Conditionally	$100-? per acre	1-3 Weeks
	Shallow areas affected	Very small areas controlled				
	No chemicals	Slow				
	Removes plants and nutrients	Correct plant ID required				
Sediment Screens	Little negative impact to whole lake	Harms benthic invertebrates	Yes	No	$20,000-50,000 per acre	Months to Years
	No chemicals	Permit required				
	Site specific control	Difficult to install				
	Reversible	Expensive				
Water Level Manipulation	Controls plants in shallows	Restricts recreational use during	Yes	No	$1,000-2,000 per acre	1-2 Years
	Sediment compaction	Perfect weather conditions required				
	2 years of control	Disrupts wildlife				
	Inexpensive (maybe)	Expensive (maybe)				
Dredging	Improves navigation	Increases turbidity	Yes	No	$20,000-80,000 per acre	Depends on sedimentation rate
	Removes plants and nutrients	Releases toxic contaminants				
		Destroys habitat				
		Very expensive				
Chemical Control	Quick relief	Repeat treatments required	Yes	Conditionally	$1,000-2,000 per acre	Months to Years
	Species specific	Does not remove nutrients				
	2 months of relief	Promotes aggressive species				
	Cost effective	Can increase algal blooms				
Biological control agents	Cost effective over the long term	Oscillating cycle of control	Yes	No	$300 - $3,000 per acre	Years
	Long term relief	Does not address nuisance natives				
	EWM specific	Susceptible to shoreline developments				
Biomanipulation	Long lasting	Hard to start	No	No	Varies	Varies
	Self sustaining	Alters habitat				
	No chemicals	May have negative impacts on habitat				
	Improves water quality	Can be irreversible				
	Improves fishery					

[1] Cost range per acre treated without consideration of longevity of effects (Holdren et al. 2001)

4.5 Recommendations

Completed

Primary Management Tool Selected[2]

The primary management tool selected by the Association is chemical control of exotic species and ongoing monitoring.

Eurasian water-milfoil is present in approximately 14 different areas of Dutch Hollow Lake. In recent years it has created a nuisance for recreational activity in select areas around the lake. 74% of the survey respondents are concerned that the plants, if left unmanaged, will spread further and worsen the impacts on the lake. In addition, they are also concerned that Dutch Hollow Lake's water quality is decreasing annually.

"We treated approximately nine acres of EWM in 2006 with chemical herbicide. The results were mixed with the majority of good control occurring at the west end of the lake and poor control near the dam. In the future, we plan to aggressively treat additional acreage of EWM with the amount depending on monies available through Dutch Hollow Lake Property Owners Association budget and WDNR grants. This will be a high priority DHLPOA budget item.

"We have chosen this tool over other treatment options for the following reasons:

- The cost of this treatment is within the range of budget dollars we have available.
- There is no danger of this treatment injuring the large number of native species we are fortunate to have in our lake due to specificity of timing and chemicals used.
- We feel this method of treatment is least likely to exacerbate the Eurasian water milfoil from spreading to other areas of our lake.
- We believe this treatment has the potential of providing long range, lasting reduction of the Eurasian water milfoil problem.

"We will closely monitor the results of our treatment plan to determine its effectiveness and to determine if and when additional treatment action is needed."

[2] Prepaired by the Dutch Hollow Association in 2006

4.6 Implementation

Plan Adoption

The Association has arranged for TLI to distribute a draft version of this document, including the APM Plan in section 5, to the vested parties for review. The vested parties have the opportunity to make suggestions for revisions to TLI. The document will then be revised and a final draft will be distributed to the Association and WDNR. The APM plan is expected to be completed in September 2006, and submitted to the WDNR shortly thereafter. The Association will adopt the plan and request support from the WDNR and Sauk County. Once the WDNR approves the plan, the Association will proceed with application to the Townships for help in getting implementation grants. If unsuccessful, recommendations will be made to finance future treatments by the Association budget.

Immediate Implementation Actions

An educational campaign designed to inform property owners about the value of aquatic plants and what they can do to help improve the water quality will start immediately. Information on how property owners and lake patrons can help protect water quality will also be included in the campaign. The Association board will have a member responsible for carrying out the educational campaign. Information and resources will be gathered from the WDNR, Sauk County, and local UW-extension office. Educational materials may be typed and distributed, posted in a public place, and/or presented as part of regular Association meetings. The purpose of the campaign is to raise awareness, solicit involvement, and promote action.

Short-term Implementation Actions

Short-term plant management actions will include EWM selective herbicide applications. Herbicide treatments can provide relief for individual property owners as well as entire bays of the lake and high use recreational areas.

Another short-term goal is to protect valuable aquatic habitat by promoting the growth of high-value native plant species and protect certain areas by minimizing impacts from management practices as well as recreationists. The Association will request that the

WDNR designate sensitive areas of the lake. The Association will then consider those areas when planning their management activities, which will be dependant upon grant monies available and DHLPOA budget constraints. Expanding no-wake zones to include sensitive areas will help protect plants and wildlife within them.

An additional short-term action will include improving water quality (gauged by annual average Secchi depth) by implementing BMPs throughout the watershed. Protecting water quality is a fundamental aspect of lake improvement projects and reflects the public's opinion that water clarity should be the most important aspect of the plan.

The Association will address short term actions by the following:

- Evaluate the status of the aquatic plant community (done)
- Monitor and protect the water quality at Dutch Hollow Lake (Self-Help monitoring, weekly Secchi depths, monthly water samples)
- Complete a public use survey (done)
- Educate members, the general public, and local governments about aquatic plant management activities and planning processes (newsletters, meetings, notices, website)
- Complete and submit an Aquatic Plant Management Plan to WDNR

Intermediate Actions

The Association will address intermediate actions by doing the following:

- Educate members and the general public in specific plant management techniques and practices
- Implement an approved treatment plan to control aquatic invasive species in Dutch Hollow Lake
- Establish a timeline for various phases of plan
- Monitor for and prevent future invasive species
- Identify any public water supply or irrigation intakes around the lake
- Implement a Clean Boats, Clean Water education program to prevent additional exotic species infestation problems

Long-term Implementation Actions

There are currently no long-term actions necessary other than to protect and monitor the lake ecosystem. Water quality monitoring will be an ongoing process, and the plant community will be monitored professionally every three to five years.

Funding Sources and Association Budget

The Association set aside and spent $14,000 for aquatic plant treatments in 2006. Future expenditures for this purpose will be discussed and budgeted during the Board of Directors annual budget process each spring. An annual budget for aquatic plant management activities will be available through the Association Treasurer after decisions are made each spring. The Association will seek outside funding sources, including DNR administered grants, by presenting the approved plan to La Valle and Woodland Townships and Sauk County.

4.7 Monitor and Modify

Monitoring the plant community with methods outlined by the WDNR ensures that objective values are obtained and that management activities are evaluated without bias. Future decisions concerning the plant community will be based on objective data gathered annually throughout implementation of the plan. The Association realizes that effective monitoring will be the result of clearly defined performance objectives.

The WDNR APM guidelines outline necessary monitoring and background information needed to perform Level I through III aquatic plant management activities in Wisconsin lakes. The guidelines recommend calculating the FQI annually. The FQI should increase if the frequency of exotic species decreases and/or the frequency of native species, especially those designated as “sensitive species,” increases. Calculating the FQI is explained in the WDNR's Aquatic Plant Management in Wisconsin guidelines.

General monitoring methods are also outlined in the WDNR's Aquatic Plant Management in Wisconsin manual. Specific monitoring is required for herbicide applications, draw-downs, and harvesting, while other recommendations exist for monitoring current exotic

species and preventing others. The current version of the manual can be found at www.uwsp.edu/cnr/uwexlakes/ecology/APMguide.asp. The Association will print a copy to keep for their reference during planning and implementation. The Association will insist that all management and monitoring activities follow the recommendations within the current draft of the manual. Additional monitoring may be required by the regional DNR aquatic plant management coordinator as part of the application process for chemical control of aquatic plants.

5.0 Dutch Hollow Lake APM Plan

5.1 Specific Elements of the Dutch Hollow Lake APM Plan

This section lists the specific recommendations of the WDNR for Level III management. The recommendations have either been satisfied based on information gathered during the 2005 Aquatic Engineering, Inc., study (black items) or still need to be fulfilled (red items).

Goals

- ✓ Purpose Statement (Section 1.0)
- ✓ Goal Statement (Section 4.1)

Management History

- ✓ Summary of past management activities (Section 3.0 Aquatic Plant Survey Technical Report)

Plant Community

- ✓ Comprehensive species list and review growth cycles of dominant species (Section 5.1 Aquatic Plant Survey Technical Report)
- ✓ Total surface area covered by aquatic vegetation (Appendix A&C Aquatic Plant Survey Technical Report)
- ✓ Highlight rare, threatened or endangered species and species of concern (Appendix A&C Aquatic Plant Survey Technical Report)
- ✓ Highlight invasive and non-native species, map, and compare to native community (Appendix A&C Aquatic Plant Survey Technical Report)
- ✓ Describe beneficial use of plants as well as nuisance or use conflicts associated with plant community (Section 2.3 Aquatic Plant Survey Technical Report)
- ✓ Describe vegetative characteristics of near shore or shoreland areas (Section 5.4 Aquatic Plant Survey Technical Report)
- ✓ Collect quantitative data of the lake's aquatic plant community (Section 5.1 Aquatic Plant Survey Technical Report)
- ✓ Determine the percent frequency of each species present (Section 5.1 Aquatic Plant Survey Technical Report)
- ✓ Determine the lake's FQI (Section 5.1 Aquatic Plant Survey Technical Report)
- ✓ Collect three samples of each species for herbarium specimens (AEI 2005)
- ✓ Label sites where rare, threatened, endangered, special concern, invasive, and non-native plants were found (Appendix A&C Aquatic Plant Survey Technical Report)
- ✓ Map areas to show dominant species type and aquatic invasive species (AIS) (Appendix A&C Aquatic Plant Survey Technical Report)
- ✓ Maintain plant information in database or GIS including species name, location, and date sampled (Appendix A&C Aquatic Plant Survey Technical Report)
- ✓ Create map depicting proposed management areas and affect of management (Section 5.2)

- ✓ Map coordinates to be recorded on GIS map (Section 5.2)

Lake Map

- ✓ Obtain map with accurate scale (Appendix A&C of Aquatic Plant Survey Technical Report)
- ✓ Determine township, range and section of lake (Section 1.0 Aquatic Plant Survey Technical Report)
- ✓ Tabulate lake surface area, and maximum and mean depths (Section 1.0 Aquatic Plant Survey Technical Report)
- ✓ Find Water Body Identification Code (WBIC) assigned by WDNR (Section 1.0 Aquatic Plant Survey Technical Report)
- ✓ Obtain aerial photos of lake (Appendix A&C Aquatic Plant Survey Technical Report)
- ✓ Obtain bathymetric map of lake (Not available)
- ✓ Identify sediment characteristics (Section 5.3 Aquatic Plant Survey Technical Report)
- ✓ Use GPS to record locations of specific sites of interest such as plant sampling locations (Section 4.0 and Appendix A&C Aquatic Plant Survey Technical Report)

Fishery & Wildlife

- ✓ Prepare a narrative describing the fish and wildlife community and its relationship to the plant community (Section 3.4 Aquatic Plant Survey Technical Report)
- ✓ Identify any areas designated as "Sensitive Areas" by the WDNR (Section 3.9 Aquatic Plant Survey Technical Report)
- ✓ Identify areas where rare, threatened, or endangered species or species of special concern exist (Sections 3.1 and 3.4 Aquatic Plant Survey Technical Report)
- ✓ Conduct specific surveys as required (Not available)

Water Quality

- ✓ Obtain one year of current water quality, including a minimum of five Secchi disk readings from June 1 to August 31
- ✓ Prepare summary of historical data (Section 3.2 Water Quality Monitoring Technical Report)
- ✓ Measure the temperature and dissolved oxygen at one-meter intervals at the deepest point of the lake during the summer (Section 4.1.4 Water Quality Monitoring Technical Report)
- ✓ Measure nutrient levels for TP, TKN, nitrate, ammonium and nitrite throughout the summer and obtain nutrient budget if available (Section 4.0 Water Quality Monitoring Technical Report)
- ✓ Measure chlorophyll-a concentrations, turbidity, alkalinity, and pH throughout the summer (Section 4.0 Water Quality Monitoring Technical Report)

Water Use

- ✓ Note primary human use patterns in the lake and on shore *(Section 5.4 and 5.7 Aquatic Plant Survey Technical Report)*
- ✓ Note areas where use is restricted for any reason (Section 3.8 Aquatic Plant Survey Technical Report)
- ✓ Collect public survey to gather opinions and perceptions on plant and water conditions (Section 4.7 Aquatic Plant Survey Technical Report)
- ✓ Note water intakes for public water supply or irrigation *(Section 3.8 Aquatic Plant Survey Technical Report)*
- ✓ Include the above information on GIS map (Section 4.5 Water Quality Technical Report)

Watershed Description

- ✓ Provide topographical map showing watershed boundaries, inflows and outflows (Section 1.0 Aquatic Plant Survey Technical Report)
- ✓ Determine watershed area (4.5 Water Quality Technical Report)
- ✓ Quantify land use areas within watershed (Section 4.5 Water Quality Technical Report)
- ✓ Calculate nutrient loading by area (Section 4.0 Water Quality Technical Report)
- ✓ Locate all inputs into lake including streams, drainage ditches, drain tile, etc. (Section 1.0 Aquatic Plant Survey Technical Report)
- ✓ Include the above information on GIS map (Section 4.5 Water Quality Technical Report)
- ✓ Model the lake and watershed to develop annual nutrient budget (Section 4.0 Water Quality Technical Report)

Analysis

- ✓ Identify management objectives needed to maintain and restore beneficial uses of the lake (Section 4.0)
- ✓ Create maps and overlays of the information from the inventory and interpret the results (Section 6.0 and Appendix A&C Aquatic Plant Survey Technical Report)
- ✓ Identify target levels or intensity of manipulations (Section 4.3)
- ✓ Map areas proposed for management (Section 5.2)
- ✓ Mapping coordinates should be recorded on a GIS map (Section 5.2)

Alternatives

- ✓ Plans should include measures to protect the valuable elements of the aquatic plant community as well as measures to control nonnative and invasive plants, plants that interfere with beneficial lake uses, and plants that enhance habitat for fish and aquatic life (Section 5.7)
- ✓ Discuss most common plant control techniques, benefits, drawbacks with vested parties (Section 4.4)
- ✓ Provide sufficient information regarding the feasibility, costs, and duration of control expected of each alternative (Section 4.4)
- ✓ Discuss the potential adverse impacts of each alternative (Section 3.2)

Recommendations

- ✓ Develop an invasive species prevention program including education and monitoring (Section 4.6)
- ✓ Implement "Clean Boats, Clean Waters" program (Section 5.3)
- ✓ Involve the public in keeping the lake healthy by finding ways to decrease harmful watershed inputs (Section 5.5)
- ✓ List proposed control actions beyond those strictly necessary for aquatic plant management that will be implemented to achieve desired level of control (Section 5.4)
- ✓ Identify specific areas for control on a map and list the level of proposed management (Section 5.2 and 4.3)

Implementation

- ✓ Describe education or prevention strategies needed to maintain and protect the plant community (Section 4.6)
- ✓ Describe how all the management recommendations will be implemented, the methods and schedules applicable to the operation, including, timing, capital, operational cost estimates, and maintenance schedules if applicable. Describe the roles and responsibilities of the persons and/or organizations involved in the management process (Section 5.0)
- ✓ Describe how the public will be involved (Sections 5.3 and 5.5)
- ✓ Prepare a budget and identify funding sources, including plans for grant application (Section 4.6)
- ✓ Describe the process by which the plan will be adopted, revised, and coordinated, with WDNR approval (Section 4.6)

Monitoring and Evaluation (Lakes with Known Invasive Populations and Following Management Actions)

- ✓ Monitor for invasive aquatic plants in early spring and twice in the summer Perform quantitative plant survey at least once every five years (Section 5.3)
- ✓ Track diversity indices such as FQI for early warning signs of decreasing diversity or water quality (Section 5.7)
- ✓ Contract for a professional survey every 3 to 5 years for the presence of exotic species and for updating the native plant list (Section 5.7)
- ✓ For lakes with known exotics, sample more often, use the rake method, and sample areas of know infestation, major inlets, and boat launches (Section 5.7)
- ✓ Following management activities collect basic water chemistry and physical parameters such as TP, TKN, temperature, pH, dissolved and dissolved oxygen at a mid lake site and within each management zone (Section 5.5)

5.2 Annual EWM Herbicide Applications

The Association has chosen to manage EWM beds with aquatic herbicides. The distribution and density of EWM in 2005 suggests spot treatments are the best way to manage the plant (Figure 3). Spot treatments consist of the herbicide applicator

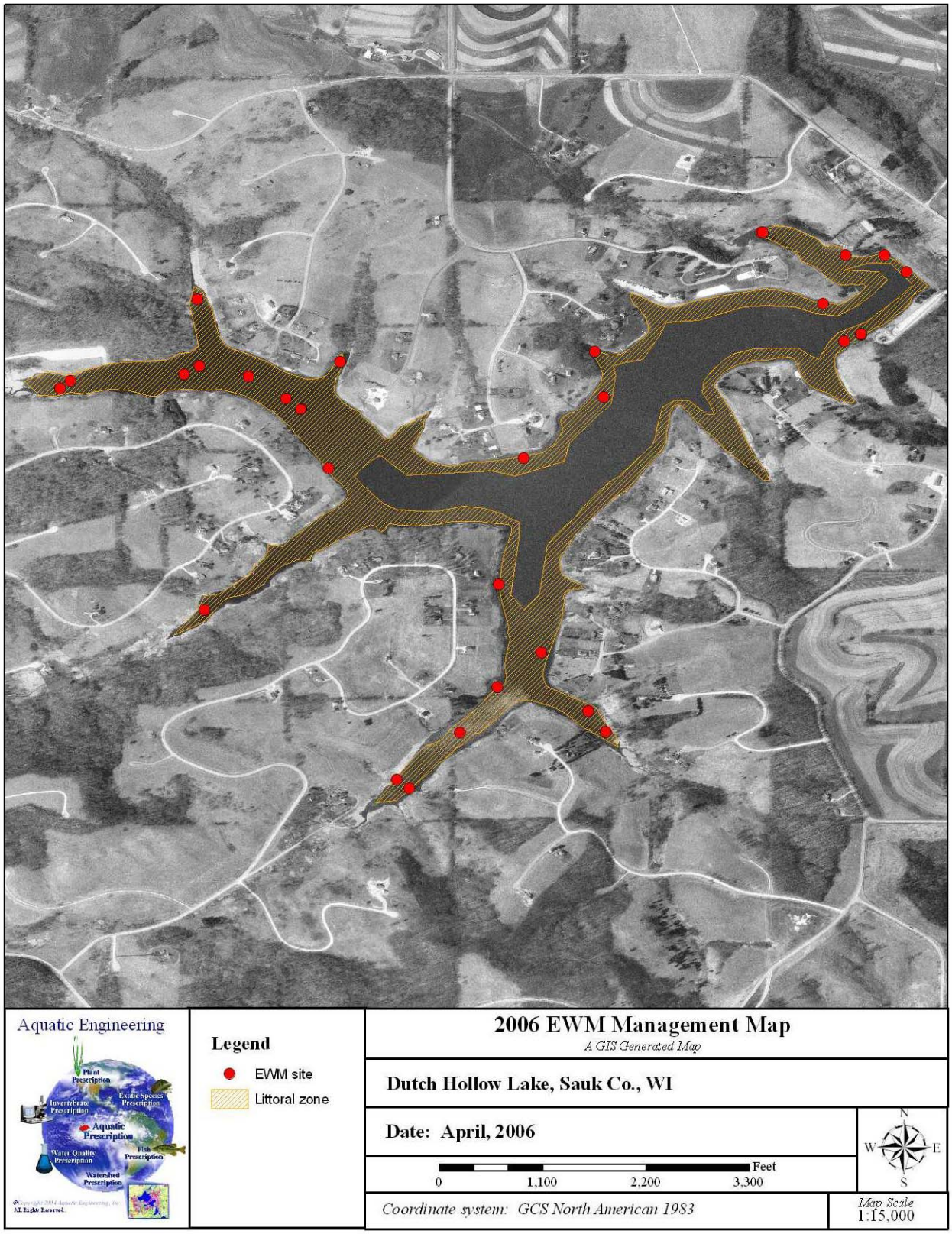

Figure 3. Eurasian water-milfoil Management Zones on Dutch Hollow Lake (Sauk County, WI)

touring the entire littoral zone looking for patches of EWM and treating them as they are encountered. Typically, spots are treated with a granular 2,4-D product at the maximum label rate. When treating spots, it is important to consider the effects of dilution due to typical water movement. Because dilution is a greater factor for smaller spot treatments, we recommend treating a minimum of a 20-foot diameter circle with the EWM stems in the center of that circle.

Where EWM is found in larger beds (approximately two or more acres), the treatment protocol should be to broadcast granular 2,4-D at 75 percent of the maximum label rate (Figure 4). Large areas need to be sampled with the rake method prior to treatment to determine an objective density of EWM. There should be one sample point for each acre with a minimum of three sample points per treatment zone. Sample points should be recorded on GPS and re-sampled after the herbicide has taken affect.

All sample sites and treatment sites (both spot and large area treatments) will be recorded with GPS technology and reported in an annual management implementation report. The Association will get a map showing the sites and a table of the points with their longitude, latitude and coordinate system listed.

The Association is fully committed to gaining control of EWM and to reduce its distribution and density to manageable levels that do not impact recreation. The Association realizes that eliminating EWM all together is not a realistic goal. The focus, instead, is on long-term management using proven methods and objectively assessing the success of each technique attempted.

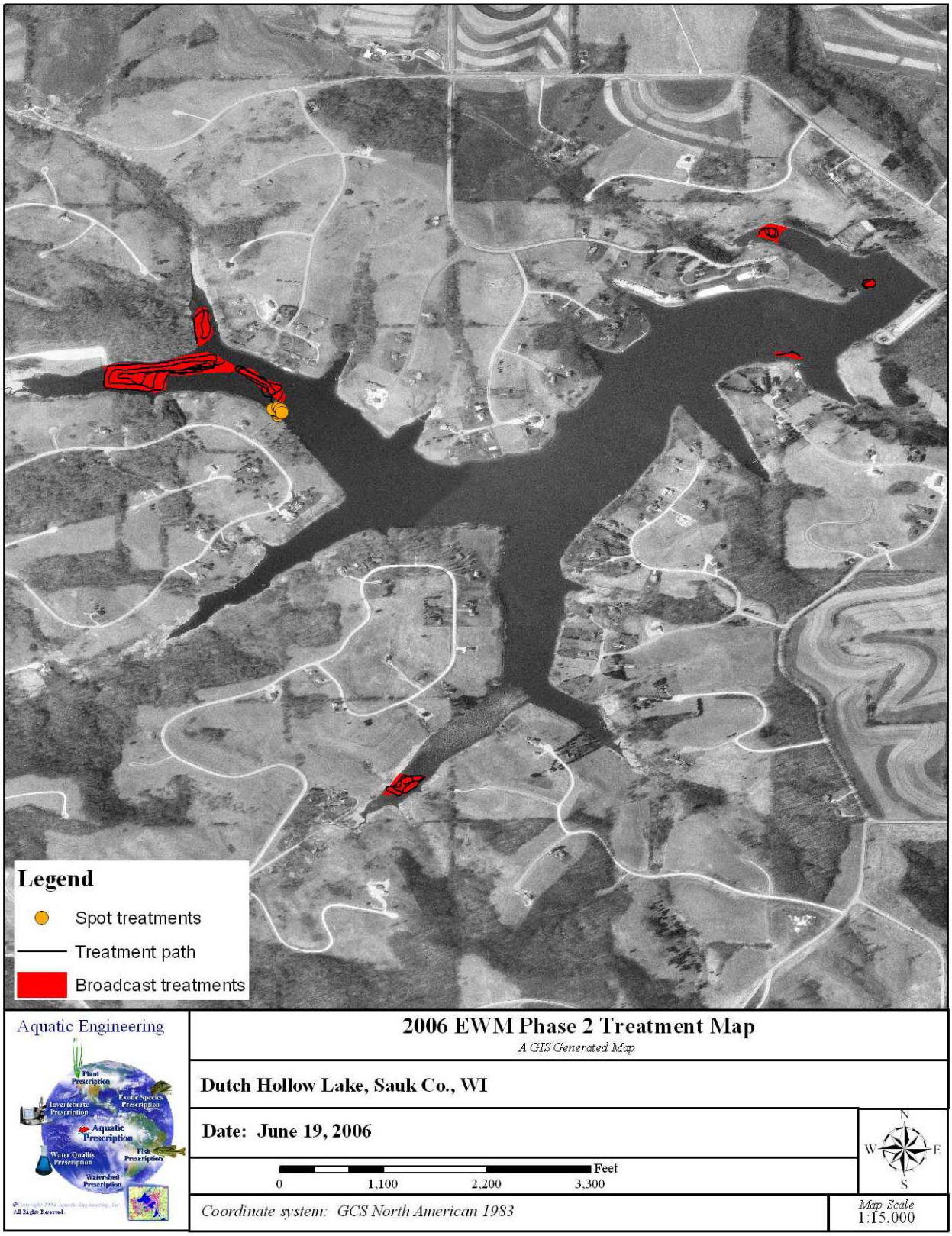

Figure 4. Broadcast treatments for EWM occurred in 2006.

5.3 AIS Prevention Program

In addition to chemical control, the Association will monitor for all non-native species. It is important to prevent the spread of invasive species both into and out of the lake. The Association will recruit volunteers, organize training sessions, and schedule monitoring events. The volunteers will monitor boat launches per plan as prepared annually by the Lake Committee. In addition, the volunteers will report the program status to the Board. The necessary volunteer training will be gained through the WDNR's Clean Boats, Clean Waters program. A network of Association representatives with addresses and phone numbers will be available to each person monitoring the launches in case of an invasive occurrence. In addition, the contact information for the local WDNR warden will be provided to each volunteer monitor.

The Dutch Hollow Lake will participate in the Clean Boats-Clean Water Program outlined by the WDNR, and the following information was prepared by the Lake Management Committee of DHLPOA.

> "The guidelines of watercraft inspections are designed to increase public awareness about invasive species and to assist boaters in taking preventive steps to avoid the further spread of nasty plants and critters. The procedures for Clean Boats-Clean Water Program are for the chairman of the Lake Management Committee to appoint a DHL Coordinator each year to carry out the Clean Boats-Clean Water Program. The coordinator will obtain necessary supplies, solicit volunteers, arrange for training, post the annual schedule, oversee monitoring, and insure that all documentation is properly completed.
>
> "At the time of monitoring, the volunteers will use the boat landing inventory data sheet, watercraft check point sheet, and the watercraft inspection daily work diary documents as provided by the WDNR. These documents will serve as a guideline to inspections and to record all pertinent data.

> "During monitoring, the volunteers will have prepared a message, wear Clean Boats-Clean Waters t-shirts, always introduce themselves, explain what and why there are trying to accomplish, approach boaters before they get to the ramp, always ask the boater for his/her participation, be polite and courteous, listen to boaters concerns and take notes, ensure that the boaters know they can make a difference, and to pass out literature related to the program. However the volunteers will not begin to ask questions immediately before they introduce themselves or before they state what and why they are there. In addition, the volunteers will not delay boaters or cause back-ups, preach to the boaters, emphasize fines, force their message on the boaters, or try to enforce laws."

Monitoring the lake for CLP will occur in early spring, while monitoring for EWM will occur twice in the summer. Monitoring for these invasive species will follow WDNR recommendations for monitoring in lakes with known exotics. Areas of previous infestation, inlets, outlets, and boat launches are areas of special concern. These require specific sampling methods and will follow the current guidelines.

5.4 High Recreational Use Area Management

In addition to chemical control, the Association will assist individual property owners in locating professional management services by keeping contact information for several firms on record and available to members. A list of these firms is kept on the UW-Extension's Lake List website (www.uwsp.edu/cnr/uwexlakes/lakelist/default.asp).

For near-shore areas of high recreational use (around piers, docks and swimming areas) the WDNR typically allows chemical treatment of nuisance native aquatic vegetation. For areas with high value vegetation and areas designated as sensitive, a smaller corridor may be permitted. Management in those areas will be limited as permitted by the WDNR.

Members may also manage their private shorelines as legally defined in state statutes NR 107 and NR 109. The only time a permit is not required to control aquatic plants is when

a riparian land owner manually removes (i.e., hand-pulls or rakes), or gives permission to someone to manually remove, plants (except wild rice) from his/her shoreline in an area that is 30 feet or less in width along the shore and is not within a Designated Sensitive Area. The non-native invasive plants (EWM, CLP, and purple loosestrife) may be manually removed beyond 30 feet without a permit, as long as native plants are not harmed. Wild rice removal always requires a permit. TLI highly recommends contacting the WDNR APM coordinator prior to conducting any plant management activities.

5.5 Water Quality Management

Water quality parameters such as Secchi depth, total phosphorus, and chlorophyll *a* will be monitored on a regular basis. The Association will follow WDNR guidelines, which recommend a full water quality analysis one year out of every three. This will include Secchi depth monitoring, depth profiles for temperature and dissolved oxygen, and water quality laboratory analysis for TP, TKN, TSS and chlorophyll *a*. Samples will be collected in a manner consistent with the 2005 sampling protocols.

Property owners can improve water quality conditions by implementing watershed BMPs. These include storm water retention facilities, riparian buffer zones, and erosion control ordinances. Future development should focus on protecting the lake from sedimentation and nutrient inputs.

Association members will also participate in monitoring water quality by participating in the WDNR's Self-help water quality monitoring. This monitoring is an easy way to get residents involved and will result in quality baseline water clarity data. The following procedures for volunteer water quality monitoring at Dutch Hollow Lake were written by The Lake Management Committee of the DHLPOA.

> "Dutch Hollow Lake will participate in the Lake Monitoring Program as outlined by the WDNR and the following procedure outlines the steps and scope for implementing and carrying out monitoring procedures. To begin, the chairman of the Lake Management Committee will appoint a DHL coordinator each year to carry out lake monitoring. The lake coordinator will then contact the DNR

Southern Region Citizen Lake Monitoring network coordinator for instructions and materials, assure volunteers are trained and establish a lake monitoring schedule. Lake monitoring will include Secchi disk water clarity readings every two weeks starting the last week of April and ending the first week of October. Additional lake monitoring measurements will include water temperature, phosphorus, chlorophyll *a*, and dissolved oxygen. These measurements will be taken five times per year near the end of May, June, July, August, and the first week of October with chlorophyll *a* not being measured during the May monitoring.

"The lake monitoring group will check for Zebra mussels by placing a Zebra mussel collection device in the water and will occasionally monitor the device. Besides monitoring for Zebra mussels, the group will also monitor the lake for other invasive species such as Eurasian water-milfoil and curly-leaf pondweed.

"Dutch Hollow Lake may contract with outside contractors to treat invasive species as required. Members of the Lake Monitoring Group will follow the treatment, obtain maps of the areas treated and monitor the results. Afterwards, a report of the after treatment survey will be furnished to the Lake Management Committee, the treatment contractor, and a copy will be filed with other lake management data at the DHLPOA Clubhouse. In addition to reports being filed at the DHLPOA Clubhouse, monitoring forms and equipment for carrying out procedures will also be kept there.

"An assigned monitor will make entries onto the proper lake monitoring forms and the information will be transmitted to the DNR via the computer by one of the DHL employees at the clubhouse. There are two forms, one for only Secchi disk readings and the other form is for Secchi disk and chemistry readings. Forms and equipment can be picked up at the clubhouse and returned to the clubhouse after each monitoring action

"All monitoring techniques will be carried out as outlined in the Wisconsin Citizen Lake Monitoring Training Manual. An annual monitoring schedule will be developed each spring from volunteers who are available to participate in the program. The DNR is involved in a program to monitor water clarity data using satellite imagery and there are certain days the satellite takes a path over DHL. The DNR is asking DHL to schedule Secchi readings on days when the satellite is overhead.

"There will be two types of monitoring on DHL being Secchi and chemistry readings. Secchi readings will try to be obtained on the scheduled day between 10 am and 4 pm. If weather is not conducive to taking the reading, i.e. wind, rain, ect, the reading will be taken in the next day or two. In the event that an assigned person cannot do the readings as scheduled, they are to call the coordinator so someone else can be scheduled. The other type of monitoring will be Secchi and chemistry readings. These measurements will be taken as a group and the schedule will reflect the assigned day. Any of the group who is available should report to the clubhouse on the assigned day to help perform the tests. These tests will usually be assigned on Tuesday or Wednesday at 12:30 pm. The time is set so tests can be taken and put in the mail before the post office closes.

"The monitoring procedure will be evaluated at least annually to determine if adjustments are necessary to the procedure."

The Association will have a complete hydrologic budget, nutrient budget, and nutrient response modeling performed for Dutch Hollow Lake. The information will pinpoint sources of nutrients and will uncover the best management practices to get the most results for their efforts. In addition, a watershed analysis will be done when the current land use information is updated. The analyses listed above will be dependant upon grant monies available, and DHLPOA budget constraints for these projects.

5.6 Fishery Management

The WDNR will continue to manage fish populations within Dutch Hollow Lake through monitoring and stocking. Stocking efforts will only be required if the lake experiences frequent fish kills, over fishing or poor reproductive success. Panfish may become stunted in the absence of predator fish, so predator fish populations will be assessed regularly to determine the need for fishery management.

Besides stocking efforts, size and daily bag limitations can help fish populations that are suffering from high fishing pressure. The WDNR and some private consulting firms are properly equipped to perform thorough surveys and will be contacted to perform such surveys at the discretion of the Association.

5.7 Plant Monitoring

The Association will continue to monitor the aquatic macrophyte community qualitatively every year and quantitatively every three to five years. The purpose of qualitative surveys will be to monitor the locations of exotic species (CLP and EWM), locate and map areas where aquatic plants create nuisance conditions, and maintain a current inventory of aquatic species. The FQI will be calculated after each qualitative survey and compared to previous values. This assessment will give the Association a strong record of baseline plant community data which will be used in the future to objectively determine an improvement or decline in the general “disturbance” of the lake ecosystem. Although the FQI is a quick indicator of disturbance, quantitative surveys should be used as the indicator of a changing plant community.

Quantitative surveys will occur every three to five years and will be performed concurrently with qualitative surveys. These surveys will provide objective values the Association will use to evaluate the condition of the aquatic plant community within the lake. Only the quantitative surveys will be used to determine if a shift in the aquatic plant community has occurred.

5.8 Public Outreach

The Association has created a detailed plan for public education, and it is the responsibility of the Chairman of the Lake Management Committee for the education process associated with the lake. The Chairman will utilize committee members, Board of Directors, and others to assist him/her in this project. The educational strategies for DHL will be to have a presentation at the DHLPOA annual meetings in April by DHL personnel and/or contract water quality professionals, to publish articles in *The Dutchman* at a minimum of one per year, and to post articles of interest in the clubhouse. In addition, lake plan presentations will be made to Sauk County and LaValle and Woodland township boards by DHL and contract water quality professionals. The Association will present the approved Aquatic Plant Management Plan to units of local government along with asking for assistance in receiving implementation grants. Besides presenting to local governments, the Association will schedule expert speakers for membership meetings. The Board meets on the second Saturday monthly in addition to the annual member meeting scheduled in April. In addition to presentations, there will be a series of educational articles written and published by the Association published in *The Dutchman* newsletter, which is printed quarterly and located on the Association's website.

6.0 References

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